

ATTACHMENT D-1 – AREA OF INVESTIGATION 1 PROPERTY HISTORY AND SAMPLING RATIONALE FINAL

This document summarizes the ownership and operational history for Area of Investigation 1 (AOI-1) at the US Oil Recovery (USOR) Superfund Site, previous and proposed removal actions at AOI-1, and a rationale for the proposed sample locations described in the Scope of Work. This information will also be included in the Remedial Investigation/Feasibility Study (RI/FS) Work Plan and is provided in this document as additional support for the investigative approach described in the Scope of Work.

GENERAL SITE INFORMATION

The USOR Property is located at 400 North Richey Street in Pasadena, Harris County, Texas, 77506 (Figure 3 of the Scope of Work). The approximately 12.2 acre property was most recently used as a used oil processing and waste treatment facility by US Oil Recovery LLP (USOR LLP). The facility is within a larger industrial complex in the north part of the City of Pasadena, TX. Mixed industrial/residential areas are south of the facility while Vince Bayou and the Houston Ship Channel are to the north.

An office building, security guard shack, and large warehouse (approximately 25,000 square feet in size) are present on the property. The warehouse includes a former laboratory, machine shop, parts warehouse, and a material processing area that included a filter press. Approximately 800 55-gallon drums (some in over-packs) and 212 poly totes (300-400 gallons) containing various industrial wastes are present within the warehouse. A tank farm with approximately 24 aboveground storage tanks (ASTs) containing industrial wastes located within secondary containment is located on the north end of the warehouse. A large, concrete-walled aeration basin (also called the bioreactor) is located west of the tank farm. A containment pond is located west of the warehouse and south of the aeration basin. Approximately 225 roll-off boxes fitted with precipitation covers are located on the property. An inactive rail spur enters the south-central part of the USOR Property from the south and extends north along the west side of the warehouse. A utility right-of-way with various pipelines is present within the southern part of the property and pipelines are also present outside of the property along the eastern and western sides.

The following historical operations have reportedly been conducted at the USOR Property:

- Manufacturing of arsenical, chlorate, and borate pesticide and herbicide products;
- Manufacturing of fertilizer and sulfuric acid;
- Leather tanning and cow hide exporting;
- Storage of various hard goods; and
- Used oil processing and waste treatment.

Potential On-Site Releases

This section describes potential releases from USOR property operations that may have impacted environmental media from 2005 until late 2010. These releases are described in the HRS Documentation (EPA, 2011) for the USOR Property. If the location of a release listed below is known, it is shown on Figure D-1-1.

October 7, 2005. The TCEQ Region 12 Waste Program received a complaint that alleged USOR LLP had discharged contaminated stormwater from a pipe located just outside the entrance to the property and dumped tank bottom waste into a manhole located on the southeast side of the USOR property (Figure D-1-1). The manhole was connected to the sewer line used by USOR LLP to discharge treated wastewater to the City of Pasadena. During the inspection a ditch was observed with dark colored water between N. Richey Street and the manhole. The TCEQ investigator concluded that the water appeared to overflow

**ATTACHMENT D-1 – AREA OF INVESTIGATION 1
PROPERTY HISTORY AND SAMPLING RATIONALE
FINAL**

from the manhole since the vegetation near the manhole was distressed. Soil samples were collected and results showed concentrations of arsenic, lead and mercury exceeding TCEQ Commercial/Industrial Protective Concentration Limits (PCLs) for soil protective of Class 1/2 groundwater near the manhole on the southeast side of the site and at the stormwater outfall near the front gate. The analyte list included all RCRA metals, copper, nickel, zinc, BTEX compounds, and TPH. ^{Total}Soil_{Comb} PCLs were not exceeded for any of the compounds evaluated.. There is no indication that this release migrated past the ditch near the facility.

February 23, 2006. A TCEQ Region 12 Waste Program investigator collected soil samples near the northwest corner of the tank farm where an oil spill had occurred; at the north end of the former arsenic burial pit located to the west of the warehouse building; and in a drainage area west of the warehouse building. These samples contained concentrations of arsenic, barium, lead, mercury, several pesticides, SVOCs, and VOCs exceeding commercial/industrial PCLs. Information related to the concentrations of the compounds analyzed and which PCLs were exceeded was not included in the reference to the HRS. USOR LLP reported that the oil spill near the northwest corner of the tank farm was a result of 50 to 100 gallons of liquid released onto the ground from a leaking pipeline near the containment wall. According to USOR LLP, impacted soil was removed although there is no information related to the analytical testing, area of potential impact, or the removal action. The exact locations of the releases were not provided in the HRS.

December 17, 2007. TCEQ found an unauthorized discharge of wastewater onto the ground due to cracks in the west wall of the aeration basin. Six soil samples were collected: two samples from approximately three feet from the base of the basin, one sample from approximately 58 feet away at the north fence line; two samples from the adjacent downgradient property to the north; and one sample from approximately 88 feet north of the USOR property. Arsenic, lead and mercury were measured above TRRP Tier 1 residential PCLs. Information related to the concentrations of the compounds analyzed and which PCLs were exceeded was not included in the reference to the HRS. There is no indication that this release migrated beyond the sampling point 88 feet north of the USOR property. The exact location of the release cannot be determined because a map was not provided in the HRS for this release.

March 14, 2009. USOR reported that there was a release of several hundreds of gallons of hazardous waste from the west side of the bioreactors, which migrated north on the property about 150 feet and then outside of the property another 200 feet to the north (Figure D-1-1). Affected soil was excavated and disposed of off-site. At that time, it was estimated by USOR that 90 percent of the material from the bioreactors was removed. No information was provided to indicate what compounds were analyzed for or how it was determined if soil was affected. There is no indication that this release migrated beyond 200 feet to the north of the property.

September 2009 through January 2010. During several site inspections, roll-off boxes, containers, and drums in the warehouse were observed to be leaking and no secondary containment was present. According to the RCRA §7003 Unilateral Administrative Order, “On December 2, 2009, EPA inspectors observed the stormwater basin overflow with the discharge going to Vince Bayou. An oily sheen was present in the off-site discharge.” Several waste material samples were collected but no samples of environmental media were collected. The exact locations of the releases were not noted and a map was not provided in the HRS.

July 2, 2010. After a large rainfall, the TCEQ visited the site and discovered that it had been abandoned. The TCEQ reported the potential release of hazardous substances because numerous roll-off boxes labeled as containing hazardous waste were filled with liquid, overflowing onto the ground, and the liquid

**ATTACHMENT D-1 – AREA OF INVESTIGATION 1
PROPERTY HISTORY AND SAMPLING RATIONALE
FINAL**

was flowing off-site. Because of the rainfall, Vince Bayou was flooded and breached N. Richey Rd. Because of the visual observation of uncontrolled release of liquids from the retention pond, secondary containments, and roll-off boxes labeled as containing hazardous waste, EPA initiated an Emergency Response and Removal Action to stabilize the site and prevent further migration of site related constituents off-site. The exact locations of the releases were not noted and a map was not provided in the HRS.

November 4, 2010. The Harris County Public Health and Environmental Services (HCPHES) reported that an oily discharge was occurring from USOR following a heavy rain. EPA found damaged containers in the warehouse and the overflow and off-site migration of liquids to Vince Bayou. The exact location of the release was not noted and a map was not provided in the HRS. No environmental samples were collected during this inspection.

Investigation History

According to the PA (TCEQ, 2011) and other documents, the following environmental investigations have been conducted at the USOR Property. Note that although these investigations are described in various documents and references to concentrations of various constituents are also included, sample location maps and/or actual analytical data are typically not provided in the documents. Furthermore, for many of those investigations where data are provided, the data are of limited value due to the fact that much of the data lack the required backup information such as sample location maps, quality assurance/quality control (QA/QC) data, and/or analytical method information. Data with the appropriate backup information are described in the Existing Data Evaluation section of the Scope of Work, including data summary tables and sample location maps.

1971. Over 100 soil samples were collected in the Spring of 1971 at varying depths. Sample locations were not provided. Arsenic was the only compound evaluated. Samples ranged in concentration less than 10 mg/kg to greater than 3,000 mg/kg in two samples.

1973. According to Progress Report No. 2 Dated October 3, 1973 and associated laboratory reports for several sampling events, water samples were collected in various tanks, a sump pit, and other locations; and soil samples were collected mostly from the west side of the warehouse building (but also in other locations as noted in the laboratory reports). It appears that this work was done in order to focus the areas where excavation would be conducted.

October 30, 1991. A Phase 2A Environmental Site Assessment (ESA) was prepared for Covesud S.A. by Espey, Huston & Associates (EH&A) which described the investigation of a below-grade concrete vault that was located west of the warehouse (Figure D-1-1). Soil and groundwater samples were collected from three borings. Arsenic and several pesticides were measured in soil and groundwater from all three borings while groundwater and soil samples collected at one boring also contained various organic constituents that appeared to be solvent and resin-related compounds.

November 14, 1991. EH&A completed a Phase 2B ESA for Covesud S.A. to further investigate the area near the concrete vault. A below-grade pit (tank) was also discovered within the warehouse. Samples were analyzed for arsenic and copper, VOCs, SVOCs, TPH, and pesticides. Soil and groundwater samples collected from these additional borings associated with the vault contained elevated levels of arsenic, copper and pesticides. The contents of the tank were sampled and indicated the presence of arsenic and copper but not the other analytes.

**ATTACHMENT D-1 – AREA OF INVESTIGATION 1
PROPERTY HISTORY AND SAMPLING RATIONALE
FINAL**

October 7, 1992. TWC issued a NOV for unauthorized discharge after becoming aware of soil and groundwater contamination at the USOR Property. Specifically, the NOV states, “Analytical results from soil and groundwater samples collected from the above-referenced site indicate a high concentration of arsenic, and high level of total petroleum hydrocarbons, and the presence of several pesticide and organic solvent constituents.”

December 4, 1995. Seven surface soil samples were collected by Environmental Remedies, Inc. and analyzed for TCLP metals and three water samples were collected from three concrete pits containing water and wastewater from prior industrial use as part of this investigation. All samples were analyzed for TCLP metals, VOCs, and SVOCs. Sample locations were not provided although the report indicates they are contained in an appendix to the report. The soil samples indicated the presence of barium and lead at levels below TCLP hazardous criteria. Composite samples from concrete wastewater pit 1 indicated the presence of mercury and several VOCs and SVOCs. Barium, cadmium, chromium and lead were identified in the water sample from pit 2. No results or summary information were provided for pit 3 other than a statement that this was “an outside pit that measures 8’ x 10’ and is nothing more than a water gathering pit adjacent to a water valve/fire hydrant.”

March 2, 1998. Twenty discrete surface soil samples were collected at the west side of the storage warehouse. The soil sample locations occurred beginning approximately fifty feet north of the former vault area and heading south on fifty foot centers. Arsenic concentrations ranged from the detection limit to 190 mg/kg. According to the report from Extra Environmental, Inc. dated March 2, 1998, the data indicated three areas of potential impact with 1) the highest concentrations analyzed occurred north of the former vault area; 2) the second area located south of the former value area and adjacent to the former warehouse; and 3) the third area located south of the former value area and west of the former warehouse.

June 24 through July 17, 2001. Soil and groundwater samples were collected throughout the USOR Property by EFEH & Associates as part of an Environmental Site Assessment for Arsenic in Groundwater and Soil on behalf of Mr. Decker McKim of ReMax Southeast. The report, dated August 27, 2001, indicates that the rail spur that ran along the rear of the warehouse has been removed. The current occupants were using the property to store appliances and church storage. Samples were analyzed for arsenic only. Of the 25 soil samples, only one had measured concentrations greater than 200 mg/kg and none of the groundwater samples collected from the boreholes exceeded 0.05 mg/L. The one soil samples with arsenic measured at 219 mg/kg was taken from the center of the pit on the west side of the warehouse (Figure D-1-1). On January 14, 2002, the Corrective Action Section requested additional information and submittal of an Affected Property Assessment Report (APAR).

May 16, 2002. An APAR was prepared and sent to the TCEQ by Mr. Decker McKim on behalf of Hide Exporters of Texas. It appears that this report re-packaged the data that was collected during the summer of 2001 (and submitted at that time as an Environmental Site Assessment by EFEH & Associates). TCEQ issued a notice of deficiency on August 29, 2002 requesting a revised report to fulfill the Agency reporting requirements and further information related to the use of the critical PCL for arsenic of 200 mg/kg. On March 20, 2003, the TCEQ requested additional information after reviewing a response letter dated December 26, 2002 related to the critical PCL used in the evaluation since 18 soil samples exceeded the soil to groundwater PCL of 2.5 mg/kg. In addition, this letter asked that the synthetic precipitate leaching procedure (SPLP) test be performed on soil samples.

April 2003. Twenty-nine additional soil and ten additional groundwater samples were collected and analyzed for arsenic as documented in a submittal to the TCEQ on May 6, 2003. The dimensions of the arsenic waste pit were delineated by the additional boreholes. The submittal provided information related to the impervious nature of the highly compact silty clay underlying the property and results of the SPLP

**ATTACHMENT D-1 – AREA OF INVESTIGATION 1
PROPERTY HISTORY AND SAMPLING RATIONALE
FINAL**

test. On August 18, 2003, the TCEQ gave conditional approval of the APAR: the soil assessment phase was deemed to be complete but additional information related to groundwater was requested.

September 15, 2003. Additional information was submitted by the property owner related to analytical data from samples collected on September 3, 2003 from the groundwater monitoring wells; and recorded deed notices, TRRP Deed Notice and Industrial Solid Waste Deed Notice of Waste Disposal for the arsenic pit, which was left in place at that time.

October 7, 2005. TCEQ Region 12 Waste Program investigator collected three samples of surface soil from an area of distressed vegetation located near a manhole on the southeast side of the USOR Property and analyzed the samples for BTEX, TPH and inorganic compounds. Results showed concentrations of arsenic, lead and mercury exceeding TCEQ Commercial/Industrial PCLs for soil protective of Class 1/2 groundwater near the manhole on the southeast side of the property and at the stormwater outfall near the front gate. It should be noted that ^{Tot}Soil_{Comb} PCLs were not exceeded for any of the compounds evaluated, and that the analyte list included all RCRA metals, copper, nickel, zinc, BTEX compounds, and TPH. There is no indication that this release migrated past the ditch near the facility.

February 23, 2006. A TCEQ Region 12 Waste Program investigator collected soil samples near the northwest corner of the tank farm where an oil spill had occurred; at the north end of the former arsenic burial pit located to the west of the warehouse building; and in a drainage area west of the warehouse building. These samples contained concentrations of arsenic, barium, lead, mercury, several pesticides, SVOCs, and VOCs exceeding commercial/industrial PCLs. TCEQ recommended the following corrective action: the horizontal and vertical extent of contamination must be determined, provisions under TRRP must be applied, and an APAR and Remedial Action Plan (RAP) should be submitted. Information related to the concentrations of the compounds analyzed and which PCLs were exceeded was not included in the reference to the HRS. USOR LLP reported that the oil spill near the northwest corner of the tank farm was a result of 50 to 100 gallons of liquid released onto the ground from a leaking pipeline near the containment wall. According to USOR LLP, impacted soil was removed although there is no information related to the analytical testing, area of potential impact, or the removal action. The exact locations of the releases were not provided in the HRS.

December 17, 2007. TCEQ Region 12 Waste Program investigator collected six soil samples after observing a leak in the aeration basin. Two soil samples were collected approximately three feet from the basin; one soil samples was collected approximately 58 feet away at the north fence line; one sample was taken approximately 88 feet north of USOR property; and two soil samples were collected on the adjacent down-gradient property to the north. The two samples collected to the adjacent down-gradient property to the north contained petroleum hydrocarbons at levels that required remediation. All six soil samples contained arsenic, lead, and/or mercury exceeding TCEQ TRRP Tier 1 residential PCLs. Information related to the concentrations of the compounds analyzed and which PCLs were exceeded was not included in the reference to the HRS. There is no indication that this release migrated beyond the sampling point 88 feet north of the USOR property. The exact location of the release cannot be determined because a map was not provided in the HRS for this release.

October 12, 2009. Confirmation samples were collected and analyzed for metals, VOCs, and SVOCs to confirm that site remediation objectives (Tier 1 Commercial/Industrial Soil PCLs) had been met within one week following a March 14, 2009 release of waste from the aeration basin. Arsenic concentrations off-site were elevated but USOR indicated that the bioreactors did not contain arsenic-bearing material since they do not receive arsenic-bearing waste at the facility.

**ATTACHMENT D-1 – AREA OF INVESTIGATION 1
PROPERTY HISTORY AND SAMPLING RATIONALE
FINAL**

Removal/Response Actions

This section describes removal or remedial actions that have occurred at the facility based on available documents. In addition, proposed remedial actions by the PRP group are provided. Additional actions may be necessary pending the results of the RI.

Property Owner Actions

December 7, 1973. In a progress report from Rhodia Inc., Chipman Division dated December 7, 1973 related to actions required following a court hearing, a removal action consisting of the removal of 5,000 yds³ of arsenic-contaminated soil from an area on the west side of the warehouse building (what is now the tank farm) was completed. The contaminated soil was disposed of on-property and treated with lime to immobilize the arsenic. Based on a September 1973 drawing, the borrow pits are located on the southwest portion of the property.

1990. Contaminated soil was removed and placed in an on-site pit on the west side of the warehouse and mixed with lime to form calcium arsenate and thus render it insoluble in water. This is later called the arsenic waste pit.

September 22, 2003. USOR removed 1,608 cubic yards of arsenic waste and soil from a buried waste pit on the west side of the warehouse. This material was disposed of off-site. On October 10, 2003, the TCEQ approved the waste removal report. On October 17, 2003, the TCEQ indicated to Hide Exporters of Texas that TRRP Remedy Standard A had been achieved for this area and no post-response action care was needed. This letter addresses two reports that are not in the PA (TCEQ, 2011 or HRS documentation) – Groundwater Sampling and Institutional Control Report dated September 15, 2003 and Groundwater Sampling Report dated September 26, 2003.

July 21, 2005. Sixty cubic yards of soil was excavated near a manhole and ditch associated with surface water discharge from USOR Property. This excavation was reported by USOR to be in response to a request from the City of Pasadena Fire Marshal after a paint spill occurred on N. Richey Rd. USOR employees indicated that the October 2005 incident involving the manhole and an alleged release was a result of Vince Bayou flooding and then becoming stagnant in the excavated areas that were now lower-lying than the rest of the general area.

Letter from USOR dated March 2, 2006. USOR reported that, on or during a TCEQ inspection on January 10, 2006, 50 to 100 gallons of liquid was released onto the ground from a leaking pipeline near the containment wall by Tank 3. Impacted soil was removed although there is no information related to the analytical testing, area of potential impact, or the removal action.

Letter from USOR dated October 12, 2009. Following a release of hazardous waste from the west side of the bioreactors, which migrated north on the property about 150 feet and then outside of the property another 200 feet to the north, USOR initiated response actions that included removing liquids by vacuum truck and removal of about 3 inches of soil by dozer, backhoe and hand excavation from the affected areas. 115 cubic yards of soil was disposed of off-site in the Fort Bend Landfill. Confirmation samples were collected and analyzed for metals, VOCs, and SVOCs to confirm that site remediation objectives (Tier 1 Commercial/Industrial Soil PCLs) had been met within one week following a March 14, 2009 release of waste from the aeration basin. Arsenic concentrations off-site were elevated but USOR indicated that the bioreactors did not contain arsenic-bearing material since they do not receive arsenic-bearing waste at the facility.

**ATTACHMENT D-1 – AREA OF INVESTIGATION 1
PROPERTY HISTORY AND SAMPLING RATIONALE
FINAL**

EPA Lead

August 2, 2010. EPA completed its Emergency Response and Removal at the site, which included securing and inventorying 225 roll-off boxes, 797 drums, and 212 poly totes and disposing of approximately 392,000 gallons of non-hazardous material off-site.

November 4, 2010. Following a heavy rain and observing damaged containers in the warehouse leaking and migrating off-site, EPA recovered approximately 410,000 gallons of non-hazardous oily liquid waste from the north and south secondary containment (tank farm) areas, sumps and bays, and parking lot. In addition, nine vacuum boxes of non-hazardous sludge waste and four vacuum boxes of hazardous sludge removed from various tanks were disposed of off-site. EPA personnel completed the emergency response on December 20, 2010.

PRP Removal Actions

The PRP Group is in the process of implementing a series of removal actions to address some of the potential source areas on the USOR property. These removal actions are being performed pursuant to the Removal Action AOC dated August 25, 2011. Specific removal action scopes were described in addenda to the Site Stabilization and Monitoring Work Plan submitted in accordance with the Removal Action AOC requirements. Work Plan Addendum No. 1, dated April 20, 2012, described the approach and procedures for removal and off-site disposal of liquids and solids from the bioreactor followed by bioreactor demolition. The bioreactor liquids were removed in accordance with this addendum in the summer of 2012. Subsequent sampling of the bioreactor solids indicated that due to the characteristics of those materials a different removal approach would be needed. Work Plan Addendum No. 2, dated July 29, 2013, provided the approach and procedures for removal and off-site disposal of the bioreactor solids and other containerized materials, including liquids and solids in the 225 roll-off boxes associated with the former USOR operations. Removal of the roll-off box liquids has been performed. Removal of bioreactor and roll-off box solids is currently underway. Future removal actions are intended to address the contents of the aboveground storage tanks (and associated sumps and containment areas), the containment pond and totes/drums within the warehouse.

SAMPLING RATIONALE

SOIL SAMPLE LOCATIONS

On-property and off-property soil sample locations (Figure 6 of the Scope of Work) and information relied upon to determine sampling locations is presented below. This information is based on review of historic Site documents, historic aerial photographs (attached), and reconnaissance observations at the USOR property.

Soil samples will be collected to evaluate the lateral and vertical extent of constituents of potential concern (COPCs) in soils. Soil sample collection intervals would be based on location specific information (i.e., deeper samples collected from “source” or “process related” areas and shallower samples collected from surface water run-off areas) and are anticipated to include one or more of the following intervals; surface soil (0 to 0.5 ft bgs), shallow soils (0.5 to 5 ft bgs), and subsurface soil (greater than 5 ft bgs) as described in the Scope of Work.

Preliminary soil sample locations are subject to revision based on the data and information collected during RI/FS Work Plan preparation and/or during the field investigation.

**ATTACHMENT D-1 – AREA OF INVESTIGATION 1
PROPERTY HISTORY AND SAMPLING RATIONALE
FINAL**

On-Property Soil Boring Location Rationale

Sample Location	Sample Location Rationale
SB-1	Railroad spur loading/unloading pad observed in the 1944 aerial photograph (attached).
SB-2,3	Lack of vegetation in this area on aerial photographs such as 1978, as well as text in historic reports regarding burial of arsenic contaminated soils in this general location.
SB-4	Disturbed soil based on 2004 and 2008 aerial photographs.
SB-7	Disturbed soils on the southeastern portion of the property based on 2004 aerial photograph.
SB-9,10,11, 65, 66	Southeastern tank/roll-off box storage area used for the temporary containment of waste material.
SB-12	Disturbed soils along the eastern property boundary based on 1944 aerial photograph and location of tank/roll-off box storage area used for the temporary containment of waste material.
SB-13	Disturbed soils on the south-central portion of Site based on 2004, 2005, and 2007 aerial photographs; and location of tank/roll-off box storage area used for the temporary containment of waste material.
SB-14	Stockpiled equipment on the southeast corner of the warehouse based on 2005 aerial photograph.
SB-15	Equipment staging area east of the machine shop based on 2005 aerial photographs.
SB-16	Soil sample collected in 2001 with elevated arsenic concentration.
SB-17	Stockpiled material west of the machine shop and south of the containment basin based on 1978, and 2006 aerial photographs.
SB-18	Drainage ditch enters the property from the western property based on the 1944 aerial photograph.
SB-19	Drainage ditch extending from the western property dead ends at the railroad tracks, west of the warehouse, based on the 1953 aerial photograph.
SB-20, 67, 68	Northwestern property boundary adjacent to the containment pond and in the vicinity of the tanks/roll-off boxes used for the temporary containment of waste material.
SB-21	Immediately west of the containment pond.
SB-22	Possible stockpiled material located to the west of the warehouse based on the 1978 aerial photograph, possible stockpiled material located to the west of the containment pond in the 2006 aerial photograph, and location of tanks/roll-off boxes used for the temporary containment of waste material.
SB-23	Underground vault and run-off area west of the warehouse in numerous aerial photographs.
SB-24	Five cylindrical and four square tanks/pits west of the warehouse based on the 1953 aerial photograph, soil disturbance west of the warehouse based on the 1989 aerial photograph, drainage path extending north from containment pond observed in the 2005 aerial photograph, and stockpiled material north of the containment pond as observed in the 2006 aerial photograph.
SB-25	Soil sample collected on 1998 with elevated arsenic concentration.
SB-26	Drainage path extends north from the pit/pad in 1995 aerial photograph, bare soil along the northwestern property boundary based on 2002 aerial photograph, stockpiled material in the 2004 aerial photograph, and location of tanks/roll-off boxes used for the temporary containment of waste material.
SB-27	West of the bioreactors where tanks/roll-off boxes used for the temporary containment of waste material.
SB-28	Bare soil areas along the northwestern Site property boundary based on 2002 aerial

**ATTACHMENT D-1 – AREA OF INVESTIGATION 1
PROPERTY HISTORY AND SAMPLING RATIONALE
FINAL**

	photograph.
SB-29	Surface water drainage path away from bioreactors, based on Site reconnaissance observations.
SB-30	Bare soil area in the 2005 and 2007 aerial photographs, north of the containment pond, and tanks/roll-off boxes used for the temporary containment of waste material.
SB-31	Stockpiled material west of the AST area in the 1978 and 2004 aerial photographs, northwestern Site property boundary and around the aeration basin, and tanks/roll-off boxes used for the temporary containment of waste material.
SB-32	Bare soils north of the ASTs based on the 2007 aerial photograph.
SB-33	Bare soil on the north property boundary on 1953 aerial photograph, stockpiled material on the northeast corner of the Site based on 2004 aerial photograph, and tanks/roll-off boxes used for the temporary containment of waste material.
SB-40	Bare soil that appears to receive runoff from the gravel parking area north of the entrance road, based on the 2007 aerial photograph.
SB-41	Surface water accumulation area that drains to the east, just northwest of the office building, based on visual observations and aerial photographs (e.g., 2011).
SB-42	Disturbed soils along the east boundary in the 1944 aerial photograph, and surface water drainage path observed during Site reconnaissance.
SB-43	Disturbed soil south of office building as observed in the 1944 aerial photograph.
SB-44	Surface water drainage area along southern entrance road based on reconnaissance observations (see 2011 aerial photograph)
SB-45	Adjacent and southeast of AST loading/unloading area (see 2007 aerial photograph).
SB-46	Adjacent and northeast of AST loading/unloading area (see 2007 aerial photograph)
SB-85	Adjacent to aboveground pipeline
SB-86	Adjacent to aboveground pipeline
SB-87	Adjacent to aboveground pipeline
SB-88	Adjacent to aboveground pipeline

**ATTACHMENT D-1 – AREA OF INVESTIGATION 1
PROPERTY HISTORY AND SAMPLING RATIONALE
FINAL**

Off-Property Soil Boring Location Rationale

SB-5	Storm water appears to enter the property at this location from the south, based on aerial photographs and property visit visual observations.
SB-6	Storm water drainage ditch west of N. Richey Street at southeast property boundary.
SB-8	Soil sample next to manhole where TCEQ observed discharge on 10/7/2005 and collected soil samples that were measured with elevated arsenic concentrations.
SB-34	Disturbed soil at the northeast corner of the property based on the 1989 aerial photograph.
SB-35	Drainage from earthen/gravel parking area east of the warehouse based on the 2002 aerial photograph.
SB-36	Drainage from parking area east of the AST area based on 2008 aerial photograph, and tanks/roll-off boxes used for the temporary containment of waste material.
SB-37	Bare soil adjacent and east-northeast of sludge bed based on 1953 aerial photograph and historical USOR Property drawings.
SB-38	Sludge bed on the northeast corner of the property based on the 1953 aerial photograph.
SB-39	Bare soil that appears to receive runoff from the gravel parking area north of the entrance road, based on the 2007 aerial photograph.
SB-47	Storm water drainage ditch east of N. Richey Street.
SB-48	Surface water discharge point into Vince Bayou.
SB-49	Storm water drainage ditch east of N. Richey Street, east of the entrance drive.
SB-50	Storm water drainage ditch west of N. Richey Street and north of the entrance drive.
SB-51	Bare soil north of the entrance road, between N. Richey Street and the entrance gate, based on the 2004 aerial photograph.
SB-52	Gravel parking area north of the entrance road to the property, prior to entering the property, based on the 2005 aerial photograph.
SB-53	Storm water drainage ditch east of N. Richey Street.
SB-54	Storm water drainage ditch west of N. Richey Street, where surface water discharges into Vince Bayou.
SB-55	Storm water drainage northeast of the property, where surface water discharges into Vince Bayou.
SB-56	Surface water discharge into Vince Bayou.
SB-57	Surface water discharge into Vince Bayou.
SB-58	Bare soil disturbance north of the property based on 1953 aerial photograph.
SB-59	Storm water run-off from material stockpiled on northern portion of property based on 1978 aerial photograph.
SB-60	Soil sample collected on 12/17/2007 where TCEQ observed run-off from a release at the bioreactor.
SB-61	Stockpiled material north of the property boundary in the 1978 aerial photograph and bare soil area north of property based on 2004 aerial photograph.
SB-62	Bare earthen area north of Site based on 2004 aerial photograph.
SB-63	Bare earthen area north of Site based on 2004 aerial photograph.
SB-64	Bare earthen area north of Site based on 2004 aerial photograph.
SB-69	Storm water appears to enter the property at this location from the south, based on aerial photographs and property visit visual observations.
SB-70	Storm water appears to enter the property at this location from the south, based on aerial photographs and property visit visual observations.
SB-71	Adjacent to location of tank/roll-off box storage area used for the temporary containment of waste material.

**ATTACHMENT D-1 – AREA OF INVESTIGATION 1
PROPERTY HISTORY AND SAMPLING RATIONALE
FINAL**

SB-72	Adjacent to location of tank/roll-off box storage area used for the temporary containment of waste material.
SB-73	Adjacent to location of tank/roll-off box storage area used for the temporary containment of waste material.
SB-74	Adjacent to location of tank/roll-off box storage area used for the temporary containment of waste material.
SB-75	Adjacent to the containment pond and in the vicinity of the tanks/roll-off boxes used for the temporary containment of waste material.
SB-76	Adjacent to the containment pond and in the vicinity of the tanks/roll-off boxes used for the temporary containment of waste material.
SB-77	Adjacent to the containment pond and in the vicinity of the tanks/roll-off boxes used for the temporary containment of waste material.
SB-78	Adjacent to the containment pond and in the vicinity of the tanks/roll-off boxes used for the temporary containment of waste material.
SB-79	Adjacent to bioreactor and tank area
SB-80	Adjacent to bioreactor and tank area
SB-81	Adjacent to bioreactor and tank area
SB-82	Adjacent to tanks/roll-off boxes used for the temporary containment of waste material and in area of drainage away from parking lot
SB-83	Adjacent to lift station on Southeast corner of property
SB-84	Adjacent to lift station on Southeast corner of property

MONITOR WELL SAMPLE LOCATIONS

Presented below is a description of on-property and off-property monitor well locations (Figure 6 of the Scope of Work) based on review of historic documents, historic aerial photographs, and reconnaissance observations. Monitor wells will be completed within the corresponding soil boring.

Preliminary monitor wells sample locations are subject to revision based on the data and information collected during RI/FS Work Plan preparation and/or during the field investigation.

Sample Location	Sample Location Rationale
MW-1 (SB-3)	Southwestern corner of the property where a lack of vegetation and notes in reports reference burial of arsenic impacted soils. Assumed to be hydraulically up-gradient of the main operational area.
MW-2 (SB-7)	Southeastern corner of the property where disturbed soils were observed. Assumed to be hydraulically up-gradient of the main operational area.
MW-3 (SB-11)	Southeastern portion of the property where tanks/roll-off boxes are used for the temporary containment of waste material. Assumed to be hydraulically up-gradient of the main operational area.
MW-4 (SB-44)	Surface water drainage area along southern property entrance road based on reconnaissance observations. Assumed hydraulically down-gradient of warehouse maintenance area.
MW-5 (SB-42)	Near the east-central property boundary, northeast of the office where a soil disturbance was noted and adjacent to a surface water drainage path extending from the concrete truck staging area. Assumed to be hydraulically down-gradient of the warehouse maintenance area.
MW-6 (SB-21)	West of the containment pond where historic excavation was performed. Assumed to be hydraulically up-gradient of operational area.

**ATTACHMENT D-1 – AREA OF INVESTIGATION 1
PROPERTY HISTORY AND SAMPLING RATIONALE
FINAL**

MW-7 (SB-39)	Bare soil that appears to receive runoff from the gravel parking area north of the entrance road, based on the 2007 aerial photograph. Assumed hydraulically down-gradient of warehouse container storage area and containment pond.
MW-8 (SB-36)	Drainage from parking area east of the AST area based on 2008 aerial photograph, and tanks/roll-off boxes used for the temporary containment of waste material. Assumed hydraulically down-gradient of AST areas.
MW-9 (SB-33)	Near the northern property boundary in areas of bare soil disturbances and where tanks/roll-off boxes are used for the temporary containment of waste material. Assumed to be hydraulically down-gradient of the main AST area.
MW-10 (SB-32)	Bare soils north of the ASTs based on the 2007 aerial photograph. Assumed to be hydraulically down-gradient of the main AST area.
MW-11 (SB-29)	Surface water drainage path away from bioreactor, based on reconnaissance observations. Assumed hydraulically down-gradient of the bioreactor.

**ATTACHMENT D-1 – AREA OF INVESTIGATION 1
PROPERTY HISTORY AND SAMPLING RATIONALE
FINAL**

SURFACE WATER AND SEDIMENT SAMPLE LOCATIONS

Presented below is a description of on-property surface water and sediment sample locations (Figure 6 of the Scope of Work) based on review of historic documents, historic aerial photographs, and reconnaissance observations.

Preliminary surface water and sediment sample locations are subject to revision based on the data and information collected during RI/FS Work Plan preparation and/or during the field investigation.

Sample Location	Sample Location Rationale
SW-1 SED-1, SED-2, SED-3	Former railroad spur area in southwest central portion of Site. Observed to retain water based on reconnaissance.
SW-2, SED-4, SED-5, SED-6	Former railroad spur area in south central portion of Site. Observed to retain water based on reconnaissance.

As indicated in the Scope of Work, off-property sediment and surface water sample locations will be determined based on the information obtained during on-property soil, groundwater, surface water and sediment sampling and off-property soil and groundwater sampling.

REFERENCES

Texas Commission on Environmental Quality (TCEQ), 1997. Impacts of Point and Nonpoint Sources on Vince Bayou and Little Vince Bayou Segment 1007 of the Houston Ship Channel. Prepared by Greg Conley. Field Operations Division. AS-130/SR. May 1997 (document indicates 1977 but based on the Commissioners and TNRCC letterhead and date of data presented, it is believed that the document is from 1997).

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